

REMARKS

In response to the Office Action dated June 4, 2007, claims 1, 8, 10, 11, 15, 19, 21, 22, 23, 27, 28 have been amended and claims 4-6, 16, 17, 20, 26, and 30-33 have been canceled. Therefore, claims 1-3, 7-15, 18, 19, 21-25, and 27-29 are now in the case. In light of the amendments and arguments set forth herein, reexamination and reconsideration of the application are requested.

Section 102(e) Rejections

The Office Action rejected claims 1, 2, 7-9, 15, 18, 28, 29, 31, and 32 under 35 U.S.C. § 102(e) as being anticipated by Faroudja (U.S. Patent Application No. 2004/0196902). The Office Action stated that Faroudja disclose all the elements or features of the Applicant's claimed invention. In response, the Applicant respectfully traverses these rejections based on the amendments to claims 1, 8, 15, 28, the cancelation of claims 31 and 32, and the following legal and technical analysis.

In particular, the Applicant submits that Faroudja is missing at least one feature recited in the Applicant's claims. In particular, Faroudja does not disclose, either explicitly or implicitly, the material claimed feature of filtering the predicted sub-frames based on the unique frequency band of that predicted sub-frame such that frequencies outside of the unique frequency band are eliminated to generate modified predicted sub-frames.

Amended Independent Claims 1, 8, 15, and 28

Amended independent claim 1 recites a method for coding video data. The method includes dividing the video data into a plurality of layers, and encoding each of the plurality of layers independently of each other to produce an encoded version of the video data. The encoding further includes dividing a reference frame of the video data into a plurality of layers containing reference sub-frames (where each of the reference sub-frames contains a unique frequency band), generating predicted frames each containing a unique frequency band for each of the plurality layers using the corresponding reference sub-frame containing the unique frequency band to generate

predicted sub-frames, and filtering each of the predicted sub-frames based on the unique frequency band of that predicted sub-frame such that frequencies outside of the unique frequency band are eliminated to generate modified predicted sub-frames at each of the plurality of layers. The method further includes decoding each of the plurality of layers independently of each other to produce a reconstructed version of the video data.

Amended independent claim 8 recites a computer-implemented process for coding video data having video frames. The process includes dividing each of the video frames into a plurality of layers, assigning a frequency band representing different resolution levels to each of the plurality of layers such that each layer contains a specific frequency band, and encoding and decoding each of the plurality of layers independent of each other. The encoding includes using a motion compensation technique having predicted frames that contain respective predicted sub-frames at each of the plurality of layers, and filtering each of the predicted sub-frames based on a unique frequency band of each of the predicted sub-frame such that frequencies outside of the unique frequency band are eliminated to generate modified predicted sub-frames at each of the plurality of layers.

Amended independent claim 15 recites a method for coding video data containing video frames. The method includes dividing each of the video frames into a plurality of layers, and assigning a unique frequency band to each of the plurality of layers. The frequency band corresponds to resolution levels such that a lower frequency band has a lower resolution and a higher frequency band has a higher resolution. The method also includes encoding each of the plurality of layers using a lower or similar frequency band to generate encoded layers representing the video data. The encoding includes producing a prediction frame for each of the plurality of layers from a reference frame containing a lower or similar frequency band, filtering the prediction frame for each of the plurality of layers to eliminate any frequencies outside of a corresponding frequency band for that layer, and decoding each of the encoded layers using a lower or similar frequency band to produce reconstructed video data.

Amended independent claim 28 recites a hierarchical data compression system. The system includes a hierarchical encoder that encodes video data into a plurality of layers. Each of the plurality of layers contains a unique frequency band. The hierarchical encoder further includes a hierarchical prediction frame processing module that generates predicted sub-frames. Each predicted sub-frame corresponds to the plurality of layers and contains a unique frequency band. The hierarchical encoder also includes filters that filter the predicted sub-frames to remove frequencies outside a frequency band for each particular predicted sub-frame to generate modified predicted sub-frames, and the system includes an encoded bitstream containing a plurality of encoded layers, and a hierarchical decoder that decodes each of plurality of encoded layers independently of other layers.

Amended claims 1, 8, 15, and 28 recite filtering the predicted sub-frames to generate modified predicted sub-frames. “When motion compensation is used for coding, each predicted sub-frame can be obtained from reference frame and current frames at the same or lower layer. After prediction, each of the predicted sub-frames is filtered to remove any frequencies outside the frequency band for that layer” (specification, page 19, lines 1-3).

FIG. 9 of the Applicant’s specification illustrates this feature recited in claims 1, 8, 15, and 28. More specifically, “[I]n traditional block-based motion compensation approaches, a single predicted frame is created dividing chopping the reference frame 800 into blocks and matching blocks in the reference frame 800 to a current frame. The blocks of the predicted frame are essentially “glued” together. Unlike traditional block-based motion compensation approaches, the hierarchical prediction frame processing module 315 produce a plurality of predicted sub-frames from the reference sub-frames 810, 820, 830. In particular, in the as shown in FIG. 9, the low frequency reference sub-frame 810 is used to produce a low frequency predicted sub-frame 900, the mid frequency reference sub-frame 820 is used to produce a mid frequency predicted sub-frame 910, and the high frequency reference sub-frame 830 is used to generate a high

frequency predicted sub-frame 920" (specification, page 21, lines 30 and 31 to page 22, lines 1-10). In other words, each predicted sub-frame is filtered to generate a modified predicted sub-frame for a particular frequency band.

In contrast, Faroudja merely filters the input signal. Rather than filter each predicted sub-frame, the input signal 24 (see FIGS. 4 and 4A) is filtered using a low-pass filter 26 and a high-pass filter 28. These two signals then are compressed (or encoded) using the compressor 42 and the compressor 48. No additional filtering is performed. Nowhere does Faroudja disclose that during the encoding process the compressors 42, 28 include filtering predicted sub-frames to generate modified predicted sub-frames. This is an additional and critical feature recited by the Applicant's claims but not disclosed by Faroudja.

The Applicant, therefore, respectfully traverses this rejection of amended independent claims 1, 8, 15, and 28 because Faroudja does not teach, either explicitly or implicitly, the material claimed feature of filtering the predicted sub-frames based on the unique frequency band of that predicted sub-frame such that frequencies outside of the unique frequency band are eliminated to generate modified predicted sub-frames.

Because the Applicant's claim include at least one feature neither explicitly disclosed nor suggested by Faroudja, the Applicant respectfully submits that the rejections of amended independent claims 1, 8, 15, and 28 under 35 U.S.C. § 102(e) as being anticipated by Faroudja has been overcome. Moreover, rejected claims 2 and 7 depend from amended independent claim 1, rejected claim 9 depends from amended independent claim 8, rejected claim 18 depends from amended independent claim 15, and rejected claim 29 depends from amended independent claim 28, and is therefore also novel over Faroudja (MPEP § 2143.03). The Applicant, therefore, respectfully request reexamination, reconsideration and withdrawal of the rejection of claims 1, 2, 7-9, 15, 18, 28, 29, 31, and 32 under 35 U.S.C. § 102(e) as being anticipated by Faroudja based on the claim amendments, claim cancellations, and the arguments above and below.

Section 103(a) Rejections

The Office Action rejected claims 3-6, 10-13, 16, 17, 19, 20, 29, 30, and 33 under 35 U.S.C. § 103(a) as being unpatentable over Faroudja. The Office Action contended that Faroudja teaches all the elements of the Applicant's claimed invention.

In response, the Applicant respectfully traverses these rejections. In general, the Applicant submits that Faroudja is lacking at least one element recited in amended independent claims 1, 8, 15, 19, and 28. More specifically, as discussed above, Faroudja does disclose, either explicitly or implicitly, the material claimed feature of filtering the predicted sub-frames based on the unique frequency band of that predicted sub-frame such that frequencies outside of the unique frequency band are eliminated to generate modified predicted sub-frames. Further, Faroudja fails to appreciate the advantages of this claimed feature. In addition, there is no technical suggestion or motivation disclosed in Faroudja to define this claimed feature. Thus, the Applicant submits that Faroudja cannot make obvious the Applicant's claimed feature listed above.

To make a prima facie showing of obviousness, all of the claimed features of an Applicant's invention must be considered, especially when they are missing from the prior art. If a claimed feature is not disclosed in the prior art and has advantages not appreciated by the prior art, then no prima facie showing of obviousness has been made. The Federal Circuit Court has held that it was an error not to distinguish claims over a combination of prior art references where a material limitation in the claimed system and its purpose was not taught therein. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Moreover, as stated in the MPEP, if a prior art reference does not disclose, suggest or provide any motivation for at least one claimed feature of an Applicant's invention, then a prima facie case of obviousness has not been established (MPEP § 2142).

As discussed above, amended independent claims 1, 8, 15, and 28 recite the above-mentioned feature. Amended independent claim 19 recites a computer-readable

medium having computer-executable instructions for encoding video data having video frames. The instructions include dividing a video frame into a plurality of layers, where each layer contains a frequency band having a unique range of frequencies that is less than an entire frequency spectrum in the video frame and where each layer has a different range of frequencies. The instructions also include generating a reference sub-frame for each layer such that each reference sub-frame contains the frequency band associated with that layer, generating a predicted sub-frame for each layer from a corresponding reference sub-frame, where the predicted sub-frame and corresponding reference sub-frame contain the same frequency band. The instructions further include filtering the predicted sub-frame to remove frequencies outside of the frequency band associated with that predicted sub-frame to generate a modified predicted sub-frame.

As stated above, Faroudja merely filters the input signal, and performs no additional filtering, such as recited by Applicant's claims 1, 8, 15, 19, and 28.

The Faroudja also fails to appreciate or recognize the advantages of the Applicant's claimed feature of filtering the predicted sub-frames based on the unique frequency band of that predicted sub-frame such that frequencies outside of the unique frequency band are eliminated to generate modified predicted sub-frames. More specifically, this claimed feature *reduces blocking artifacts and enables hierarchical coding*. In particular, "[D]uring the production of the predicted sub-frames 900, 910, 920 from the reference sub-frames 810, 820, 830, many unwanted frequencies may be added. For example, high frequencies from caused by discontinuities between the blocks may appear in the low-frequency predicted frame 900. Because the low-frequency reference sub-frame contains only low frequencies, the predicted frame 900 should also contain only low frequencies. It is readily apparent that high frequencies do not belong and that these are unwanted high-frequencies added during the motion compensation process. Thus, each high frequency in the low-frequency predicted frame 900 must be a blocking artifact."

"In order to eliminate these blocking artifacts, the hierarchical prediction frame processing module 315 performs further filtering of each of the predicted sub-frames

900, 910, 920. In particular, a low-pass filter 930 is applied to the low frequency predicted sub-frame 900, a band-pass filter 940 is applied to the mid frequency predicted sub-frame 910, and a high-pass filter 950 is applied to the high frequency predicted sub-frame 920. This filtering process produces a low frequency modified predicted sub-frame 960, a mid frequency modified predicted sub-frame 970, and a high frequency modified predicted sub-frame 980 from each of the respective predicted sub-frames 900, 910, 920. Any high frequencies added by the motion compensation process to the low frequency predicted sub-frame 900 is removed by the low-pass filter 930 and will not show up in the modified low frequency predicted sub-frame 960. Similarly, in the high frequency predicted sub-frame 920, any low frequencies added by the aliasing effect on the block boundaries will be removed by the high-pass filter 950. If desired, an "overall" predicted frame could be obtained by properly adding the sub-frames 960, 970, and 980."

"Two important things should be noted. First, the modified predicted sub-frames 960, 970, 980 are a better prediction of the current frame than the predicted sub-frames 900, 910, 920 or traditional predicted frames. Second, the modified predicted sub-frames 960, 970, 980 are hierarchical by nature. Each of these could (after having the appropriate residue added) be used as the next reference frame, without ever making any use of the other layers. With current motion compensation techniques, the full reference frame is needed to produce a predicted frame. The hierarchical nature of the modified predicted sub-frames enables hierarchical coding" (specification, page 22, lines 17-31 to page 23, lines 1-21). Faroudja does not discuss or appreciate these advantages of this claimed feature recited by the Applicant's claims.

The Applicant, therefore, submits that obviousness cannot be established since Faroudja fails to teach, disclose, suggest or provide any motivation for the feature of "filtering the predicted sub-frames based on the unique frequency band of that predicted sub-frame such that frequencies outside of the unique frequency band are eliminated to generate modified predicted sub-frames", as recited by the Applicant's claims. In addition to explicitly lacking this feature, Faroudja fails to implicitly disclose, suggest, or provide any

motivation for this feature. Further, the Faroudja fails to appreciate advantages of this claimed feature.

Therefore, as set forth in *In re Fine* and MPEP § 2142, the Faroudja cannot render the Applicant's claimed invention obvious because Faroudja is missing at least one material feature of the Applicant's claimed invention discussed above. Consequently, because a prima facie case of obviousness cannot be established due to the lack of "some teaching, suggestion, or incentive supporting the combination", the rejection must be withdrawn. ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984); MPEP 2143.01.

Accordingly, the Applicant respectfully submits that amended independent claims 1, 8, 15, 19, and 28 are patentable under 35 U.S.C. § 103(a) over Faroudja based on the amendments to claims 1, 8, 15, 19, and 28, the cancellation of claim 32, and the legal and technical arguments set forth above and below. Moreover, claims 3-6 depend from amended independent claim 1, claims 10-13 depend from amended independent claim 8, claims 16 and 17 depend from amended independent claim 15, claim 20 depends from amended independent claim 19, and claims 29 and 30 depend from amended independent claim 28, and are also nonobvious over Faroudja (MPEP § 2143.03). The Applicant, therefore, respectfully requests reexamination, reconsideration and withdrawal of the rejection of claims 3-6, 10-13, 16, 17, 19, 20, 29, 30, and 33 under 35 U.S.C. § 103(a) as being unpatentable over Faroudja.

The Office Action rejected claims 14 and 21 under 35 U.S.C. § 103(a) as being unpatentable over Faroudja in view of Weber (U.S. Patent No. 4,306,223). The Office Action contended that the combination of Faroudja and Weber teach all the elements recited in claims 14 and 21.

In response, the Applicant respectfully traverses these rejections. In general, the Applicant submits that the combination of Faroudja and Weber is lacking at least one element recited by claims 14 and 21. More specifically, neither Faroudja nor Weber disclose, either explicitly or implicitly, the material claimed feature of “filtering each of the predicted sub-frames based on a unique frequency band of each of the predicted sub-frame such that frequencies outside of the unique frequency band are eliminated to generate modified predicted sub-frames at each of the plurality of layers.” Further, the combination fails to appreciate the advantages of this claimed feature. In addition, there is no technical suggestion or motivation disclosed in either Faroudja or Weber to define this claimed feature. Thus, the Applicant submits that the combination of Faroudja and Weber cannot make obvious the Applicant’s claimed feature listed above.

As state above, amended independent claims 8 and 19 recite the feature of filtering each of the predicted sub-frames to generate modified predicted sub-frames. As also stated above, Faroudja does not disclose this claimed feature. Weber adds nothing to the cited combination that would render Applicant’s claims 8 and 19 obvious. Weber merely discloses a data handling system that converts an analog signal into binary form and then reconstructs the signal into a facsimile of the original signal. However, nowhere does Weber discuss filtering predicted sub-frames to generate modified predicted sub-frames.

In addition, the combination of Faroudja and Weber also fails to appreciate or recognize the advantages of the feature of “filtering each of the predicted sub-frames based on a unique frequency band of each of the predicted sub-frame such that frequencies outside of the unique frequency band are eliminated to generate modified predicted sub-frames at each of the plurality of layers” recited in claims 8 and 19.

The Applicant, therefore, submits that obviousness cannot be established since the combination of Faroudja and Weber fails to teach, disclose, suggest or provide any motivation for the Applicant’s claimed feature of “filtering each of the predicted sub-frames based on a unique frequency band of each of the predicted sub-frame such that

frequencies outside of the unique frequency band are eliminated to generate modified predicted sub-frames at each of the plurality of layers.”. In addition to explicitly lacking this feature, both Faroudja and Weber fail to implicitly disclose, suggest, or provide motivation for this feature. Further, the combination fails to appreciate advantages of this claimed feature.

Therefore, as set forth in *In re Fine* and MPEP § 2142, the combination of Faroudja and Weber cannot render the Applicant’s claimed invention obvious because both Faroudja and Weber are missing at least one material feature recited in claims 8 and 19, as discussed above. Consequently, because a prima facie case of obviousness cannot be established due to the lack of “some teaching, suggestion, or incentive supporting the combination”, the rejection must be withdrawn. ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984); MPEP 2143.01.

Accordingly, the Applicant respectfully submit that amended independent claims 8 and 19 are patentable under 35 U.S.C. § 103(a) over Faroudja in view of Weber based on the amendments to claims 8 and 19 and the legal and technical arguments set forth above and below. Moreover, claim 14 depends from amended independent claim 8 and claim 21 depends from amended independent claim 19 are also nonobvious over Faroudja in view of Weber (MPEP § 2143.03). The Applicant, therefore, respectfully requests reexamination, reconsideration and withdrawal of the rejection of claims 14 and 21 under 35 U.S.C. § 103(a) as being unpatentable over Faroudja in view of Weber.

The Office Action rejected claims 22-27 under 35 U.S.C. § 103(a) as being unpatentable over Faroudja in view of Dimitrova et al. (U.S. Patent No. 6,714,594). The Office Action contended that the combination of Faroudja and Dimitrova et al. teach all the elements recited in claims 22-27.

In response, the Applicant respectfully traverses these rejections. In general, the Applicant submits that the combination of Faroudja and Dimitrova et al. is lacking at least one element recited by claims 22-27. More specifically, neither Faroudja nor Dimitrova et al. disclose, either explicitly or implicitly, the material claimed feature of “filtering the predicted sub-frame to remove frequencies outside of the frequency band associated with that predicted sub-frame to generate a modified predicted sub-frame.” Further, the combination fails to appreciate the advantages of this claimed feature. In addition, there is no technical suggestion or motivation disclosed in either Faroudja or Dimitrova et al. to define this claimed feature. Thus, the Applicant submits that the combination of Faroudja and Dimitrova et al. cannot make obvious the Applicant’s claimed feature listed above.

As state above, amended independent claim 19 recite the feature of “filtering the predicted sub-frame to remove frequencies outside of the frequency band associated with that predicted sub-frame to generate a modified predicted sub-frame.”

Moreover, amended independent claim 23 recites a computer-implemented process for decoding video data encoded in layers, where each of the layers represents a different resolution level of the video data. The process includes reconstructing a residual sub-frame containing a frequency band having a unique range of frequencies, and generating a reference sub-frame that contains the frequency band. The process also includes generating a predicted sub-frame from the reference sub-frame, wherein the predicted sub-frame and corresponding reference sub-frame contain the same frequency band, and filtering the predicted sub-frame to remove frequencies outside of the frequency band to generate a modified predicted sub-frame.

As stated above, Faroudja does not disclose this claimed feature. Dimitrova et al. add nothing to the cited combination that would render Applicant’s claims 22-27 obvious. Dimitrova et al. merely disclose traditional MPEG encoding that leverages data for content compression. However, nowhere do Dimitrova et al. discuss filtering predicted sub-frames to generate modified predicted sub-frames.

In addition, the combination of Faroudja and Dimitrova et al. also fails to appreciate or recognize the advantages of the feature of “filtering the predicted sub-frame” to remove frequencies outside of the frequency band associated with that predicted sub-frame to generate a modified predicted sub-frame” recited in claims 19 and 23.

The Applicant, therefore, submits that obviousness cannot be established since the combination of Faroudja and Dimitrova et al. fails to teach, disclose, suggest or provide any motivation for the Applicant’s claimed feature of ““filtering the predicted sub-frame” to remove frequencies outside of the frequency band associated with that predicted sub-frame to generate a modified predicted sub-frame.” In addition to explicitly lacking this feature, both Faroudja and Dimitrova et al. fail to implicitly disclose, suggest, or provide motivation for this feature. Further, the combination fails to appreciate advantages of this claimed feature.

Therefore, as set forth in *In re Fine* and MPEP § 2142, the combination of Faroudja and Dimitrova et al. cannot render the Applicant’s claimed invention obvious because both Faroudja and Dimitrova et al. are missing at least one material feature recited in claims 19 and 23, as discussed above. Consequently, because a prima facie case of obviousness cannot be established due to the lack of “some teaching, suggestion, or incentive supporting the combination”, the rejection must be withdrawn. ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984); MPEP 2143.01.

Accordingly, the Applicant respectfully submit that amended independent claims 19 and 23 are patentable under 35 U.S.C. § 103(a) over Faroudja in view of Dimitrova et al. based on the amendments to claims 19 and 23 and the legal and technical arguments set forth above and below. Moreover, claim 22 depends from amended independent claim 19 and claims 24-27 depend from amended independent claim 23, and are also nonobvious over Faroudja in view of Dimitrova et al. (MPEP § 2143.03). The Applicant, therefore, respectfully requests reexamination, reconsideration and withdrawal of the rejection of

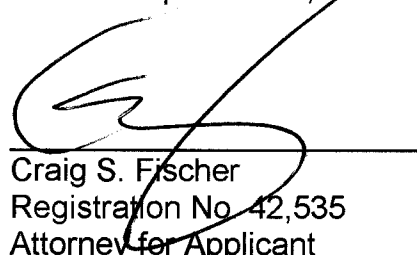
claims 22-27 under 35 U.S.C. § 103(a) as being unpatentable over Faroudja in view of Dimitrova et al.

Conclusion

In view of the amendments to claims 1, 8, 10, 11, 15, 19, 21, 22, 23, 27, 28, the cancellation of claims 4-6, 16, 17, 20, 26, and 30-33, and the arguments set forth above, the Applicant submits that claims 1-3, 7-15, 18, 19, 21-25, and 27-29 are in condition for immediate allowance. The Examiner, therefore, is respectfully requested to withdraw the outstanding rejections of the claims and to pass all of the claims of this application to issue.

In an effort to expedite and further the prosecution of the subject application, the Applicant kindly invites the Examiner to telephone the Applicant's attorney at (805) 278-8855 if the Examiner has any comments, questions or concerns, wishes to discuss any aspect of the prosecution of this application, or desires any degree of clarification of this response.

Respectfully submitted,
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Craig S. Fischer
Registration No. 42,535
Attorney for Applicant

LYON & HARR, L.L.P.
300 East Esplanade Drive, Suite 800
Oxnard, CA 93036-1274
Tel: (805) 278-8855
Fax: (805) 278-8064